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Medical laboratory TechniquesDepartment

Practical General

Chemistry Lecture (14)

(Alcohols)

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Alcohols

- Alcohols: are organic compounds characterized by the presence of a hydroxyl group (OH) in Its molecules are linked to an alkyl (aliphatic) group and are derived from hydrocarbons .

- Replacing a hydrogen atom with a hydroxyl group.

Note: Phenols also contain a hydroxyl group, but their molecules are linked Direct link to the aromatic cycle (will be studied in the aromatics course).

Nomenclature of alcohols:

1 - According to the IUPC system:

- The name is derived by replacing the letter e from the syllable ane of the corresponding alkane name In the ol syllable, for example, Methane becomes Methanol, taking into account the location of the hydroxyl group with the carbon atom number attached to it so that it should take lowest possible number.

- The hydroxyl group and the carbon atom attached to it are called the group carbinol.

2- The common nomenclature:

- The alkyl group is first named and then followed by the word alcohol.
- In the common nomenclature, the name (ISO) is used to refer to the alkyl radical.
- If the hydroxyl group carbon atom is attached to two carbon atoms (secondary alcohols).

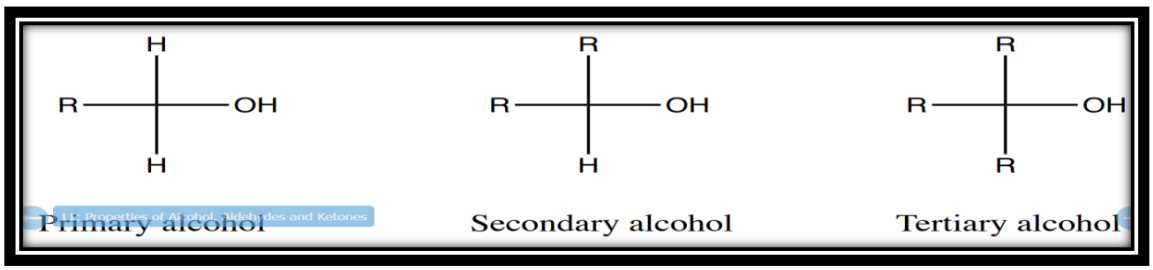
Classification of alcohols:

Alcohols are classified according to the following:

1- According to the number of hydroxyl groups: they are divided into mono, dimer and tertiary.

2- According to the carbon atom attached to the hydroxyl group, it is divided into primary secondary and tertiary.

3- They are classified into aliphatic alcohols and aromatic alcohols.



Distinguishing between types of alcohols:

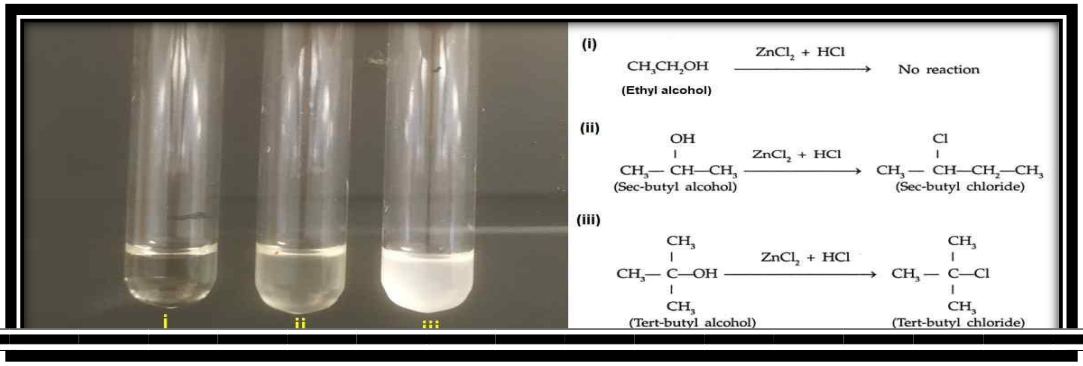
1-*Lucas reagent*

- ✓ Take (1 g) of zinc chloride in (3 ml) of concentrated hydrochloric acid in a dry test tube.
- ✓ And boil the solution for one minute, then cool it to room temperature, add to the resulting solution (1 ml) of the solution, shake the solution strongly.
- ✓ Then put it in a bath aqueous at a temperature of (27-28° C) and note the formation of alkyl halide (the solution becomes turbid) and then separates into two layers.
- ✓ The tertiary alcohol reacts immediately, but the secondary alcohol after 5 minutes has passed, and if it is separated after a long period, it indicates that it is a primary alcohol.

$$R\text{-}CH_2OH + HCl \xrightarrow{ZnCl_2} R\text{-}CH_2Cl + H_2O$$ **After 15 min**

$$R_2\text{-}CHOH + HCl \xrightarrow{ZnCl_2} R_2\text{-}CHCl + H_2O$$ **After 5 min**

$$R_3\text{-}COH + HCl \xrightarrow{ZnCl_2} R_3\text{-}C\text{-}Cl + H_2O$$ **Directly**



2-Bord and Wellman reagent

This detection is used to distinguish between types of alcohols.

- ✓ Dissolve (15-30 ml) of alcohol in (1 ml) of alcohol-free acetone, add one drop of this reagent, which can be prepared, and shake the mixture.
- ✓ The primary and secondary alcohols react within (10 seconds) to give a bluish-green complex. Tertiary alcohols do not react with this reagent.
- ✓ The reagent is prepared by dissolving (1 g) of chromic oxide in (1 ml) of concentrated sulfuric acid and diluting it with (3 ml) of water. small amount in the orange solution.

3-Ritter reagent

- ✓ Take (25-30 mg) of the substance to be examined and dissolve it in (2 ml) of water or alcohol-free acetone in a test tube.
- ✓ Then add to the solution drop by drop of (1%) aqueous solution of potassium permanganate and add acetic acid with strong shaking of the tube.
- ✓ The color of the permanganate changes and is considered a positive detection for primary and secondary alcohols.